DXB211 Creative Coding Assignment 2

P5js Sketch documentation

The concept behind my sketch is simple. It follows the constraints of a typical tower defense game based around the theme of the Harry Potter universe. In tower defense, there's a path which enemies follow when the round begins. It's up to the player to purchase weapons from the store and place them around the map in order to suppress the enemies from reaching the end of the path. If enemies do manage to get to the end of the path, you will lose health points. In the event that you lose all your health points, the game will be lost and you will have to restart from the beginning. Therefore, the goal is to successfully eliminate all the enemies while maintaining health points. Once all 5 levels have been beaten, the game is won. A majority of the interaction with the sketch is mouse interaction. You click buttons to navigate, trigger events and purchase weapons. However, there's also some hotkeys present to purchase weapons. You can use the 'Q' key to select a barbarian, 'W' to select a wizard, 'E' to select Ron, 'R' to select Hermione and 'T' to select Harry. However, due to the nature of the game, certain characters are locked until certain level thresholds are met. Therefore, these hotkeys will only work if you've unlocked the character you're trying to select via hotkey. Additionally, you can use the 'ESC' key to deselect a weapon, so, in the case of my sketch, any of the previously mentioned characters.

Figure 1: Age of War 2 and Bloons Tower Defence are two examples of popular pre-existing tower defence based games.

Design and Aesthetic Choices

As the game is based around the Harry Potter universe the design and aesthetic choices were fantasy and magical related. For example, the map that was chosen features objects such as crystals, mushrooms and oddly shaped trees. All of these are elements commonly seen throughout fantasy related media and can easily be associated with a 'magical universe.' Additionally, the enemies present in the game are spiders, ghouls, goblins and dragons, all of which are staples across fantasy related media and in particular J. K. Rowling's Harry Potter universe. The title of the game is "Hogwarts Tower Defense," therefore on the main menu I added a picture of Hogwarts, the School of Witchcraft and Wizardry from the Harry Potter universe. Furthermore, the same font used for title screen in the Harry Potter films was used for the font in the game. Music present throughout the Harry Potter films was also present in the game. In order to make the game sound less repetitive I ensured each level used a different soundtrack. Furthermore, the game over screen featured a unique 'evil' sounding track to give the 'vibe' of a defeat. Respectively, the win game screen also featured a unique 'happy' and 'successful' track to deliver the 'vibe' of a win. The main target audience for the game is children between the ages of 8 and 12. This age group overlays the target audience for Rowling's novels. As a result, I made the game have a slight resemblance in mechanics to 'Bloons Tower Defense,' a game I personally used to love and play when I was around that age bracket. Additionally, the game has a cartoony art style which targets the 8 – 12 age demographics further.

Figure 2: Spiders, dragons and goblins present in the Harry Potter universe.

Approach to the Design Process

Originally, I was considering creating a mini game based around the film Forest Gump. The idea was to create a character which the user controlled, Forest Gump, who would navigate his way around a road and its obstacles whilst dodging projectiles thrown by the bullies which were chasing him. However, I soon moved on from this idea as I thought it wouldn't be too much of a challenge, for me personally, to implement. Therefore, after some flash game browsing, I stumbled upon Bloons Tower Defence which gave me inspiration for my current game 'Hogwarts Tower Defence.' After a recent binge of the Harry Potter series, I decided to pursue a Harry Potter orientated tower defence game. To begin, I started formulating what objects, classes, that my game would be based around. I came up with the idea of 4 objects for the enemies, spiders, ghouls, goblins and dragons and 5 objects for the weapons, a barbarian, a basic wizard, Ronald Weasley, Hermione Granger and Harry Potter. I then used a Trello board to write down and organise my classes into 3 sections, 'To Do,' 'In Progress' and 'Done.' While progressing through the development of the game I also used Trello to write down and functions that I believed would need to be implemented. After I got a part of the game working, I would refactor it by removing duplicated code and placing it into a function, and create global constants to allow for the easy change of a number which would appear multiple times.

```
const UNIT = 32; // each unit in the world is 32 pixels.
const WIDTH = 45; // width, in world units.
const HEIGHT = 25; // height, in world units.
const SPIDER_SPEED = 4;
const GHOUL_SPEED = 6;
const GOBLIN_SPEED = 7;
const DRAGON_SPEED = 8;
```

Figure 3: An example of how associating numbers with a specific number allows very easy changes to key features in the game.

```
//start attacking when the enemies spawn
if (enemySpawnInPlay[levelNum - 1][0] > 0) {
  for (let i = 0; i < currentlyPlacedWeapons.length; i++) {
    weaponMovementAndDisplayHandler(i, "BARBARIAN", BARBARIAN_RANGE);
    weaponMovementAndDisplayHandler(i, "WIZARD", WIZARD_RANGE);
    weaponMovementAndDisplayHandler(i, "RON", RON_RANGE);
    weaponMovementAndDisplayHandler(i, "HERMIONE", HERMIONE_RANGE);
    weaponMovementAndDisplayHandler(i, "HARRY", HARRY_RANGE);
  }
}
```

```
function weaponMovementAndDisplayHandler(currentIndex, weaponType, weaponTypeRange) {
  if (currentlyPlacedWeapons[currentIndex].type === weaponType) {
    currentlyPlacedWeapons[currentIndex].areWeAttacking = false
    for (let x = 0; x < enemies.length; x++) {
      if (enemies[x].pos.dist(currentlyPlacedWeapons[currentIndex].pos) <= weaponTypeRange) {
        currentlyPlacedWeapons[currentIndex].areWeAttacking = true;
        currentlyPlacedWeapons[currentIndex].attackMove();
        currentlyPlacedWeapons[currentIndex].attackDisplay();
      }
    }
  }
}
```

Figure 4: An example of how duplicated code can be removed and placed inside a function which takes parameters to increase code cleanliness, readability and optimisation.
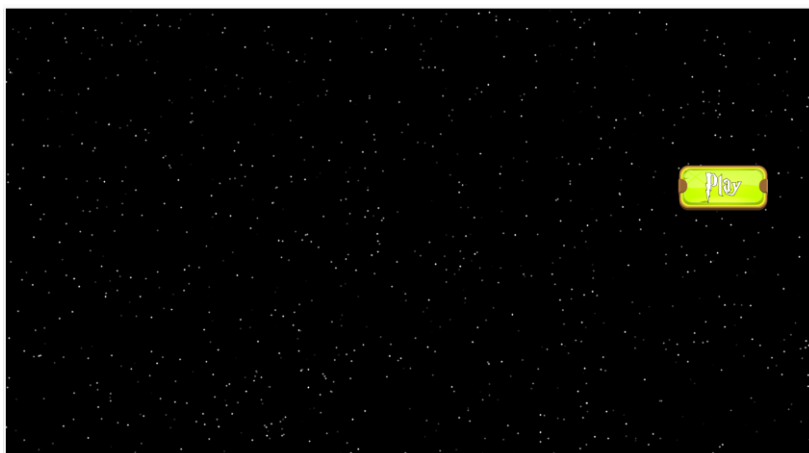
Development Log
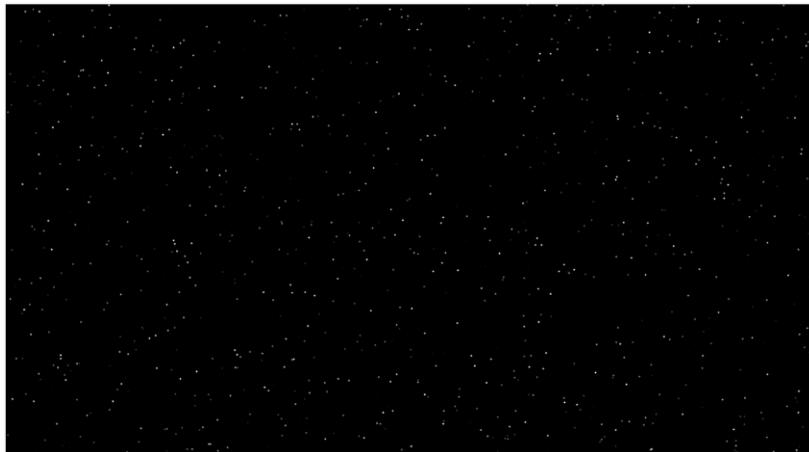
Figure 5: Created a plain black background and objects which act as 'stars.'
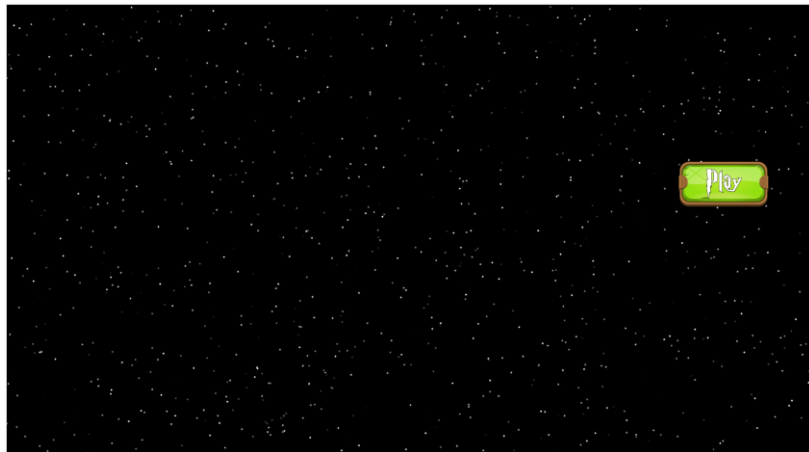
Figure 6: Added a play button with some font over it.

Figure 7: Made the button light up when hovered. This was just a simple image change depending on whether or not the mouse is within the button's radius.

Figure 8: Added a Hogwarts Castle image and some text with a green stroke

Figure 9: Added a new font for the text. The font is the same font that was used in the Harry Potter film titles.

Figure 10: Added an info button and audio button in the bottom right. I also made the image of these buttons change when hovered.
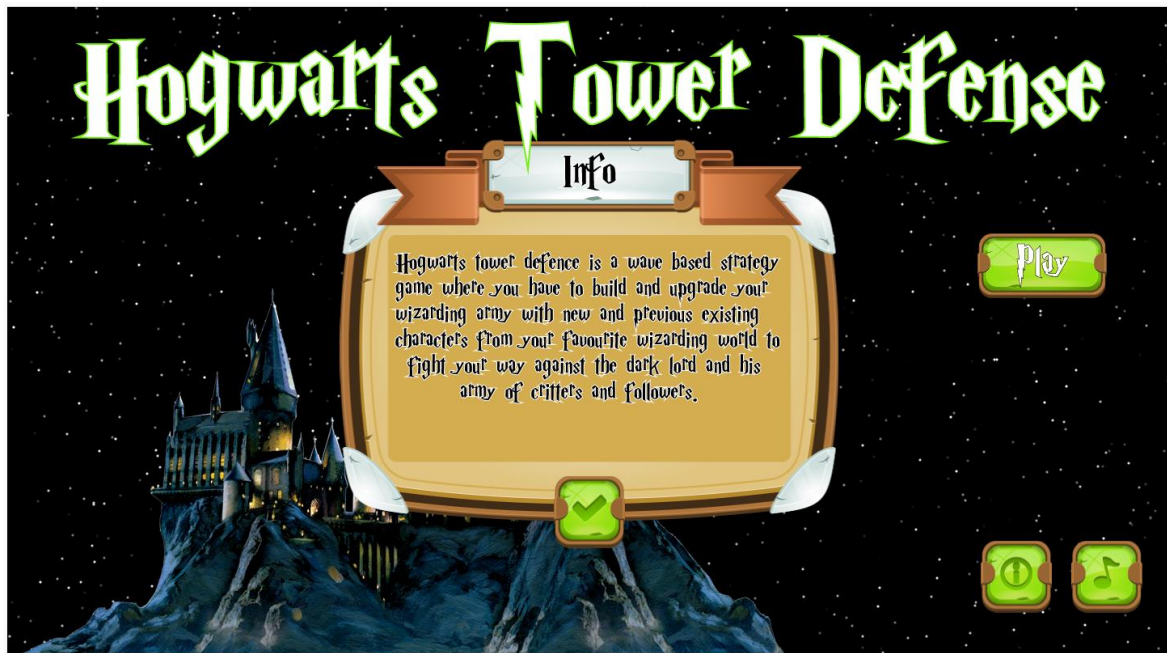
Figure 11: Added a mousePressed() event that opens up an information dialogue when the info button in the bottom right is pressed. I also added a mousePressed() event to detect when the OK button the middle of the dialogue is pressed to close it.

Figure 12: Added another mousePressed() event to detect when the audio button is pressed. When the button is pressed it changes to the image shown in this screenshot to denote that the audio is currently muted. Once it's pressed again it changes back to the original image meaning the audio is unmuted and currently playing.

Figure 13: I implemented another `mousePressed()` *event to detect whether or not the player has clicked the play button. If the button is pressed it would take them to this screen. I purchased a tower defense orientated map that I thought would fit the Harry Potter theme and added it onto this screen.*

Figure 14: Because I didn't want 2 entry points for the enemies to come through, I loaded the image into Photoshop and remove the second entry at the bottom. I then saved the image and loaded that one into my sketch instead.

Figure 15: For the right-hand side I loaded in another image. This panel would become the interface for the health, gold and weapons.

Figure 16: I added some further image for the gold icon, health icon, weapon backgrounds and the go button. I then added some text to represent how much gold and health the player has. I also added a function to detect when the mouse is within the go button's radius so it changes image.
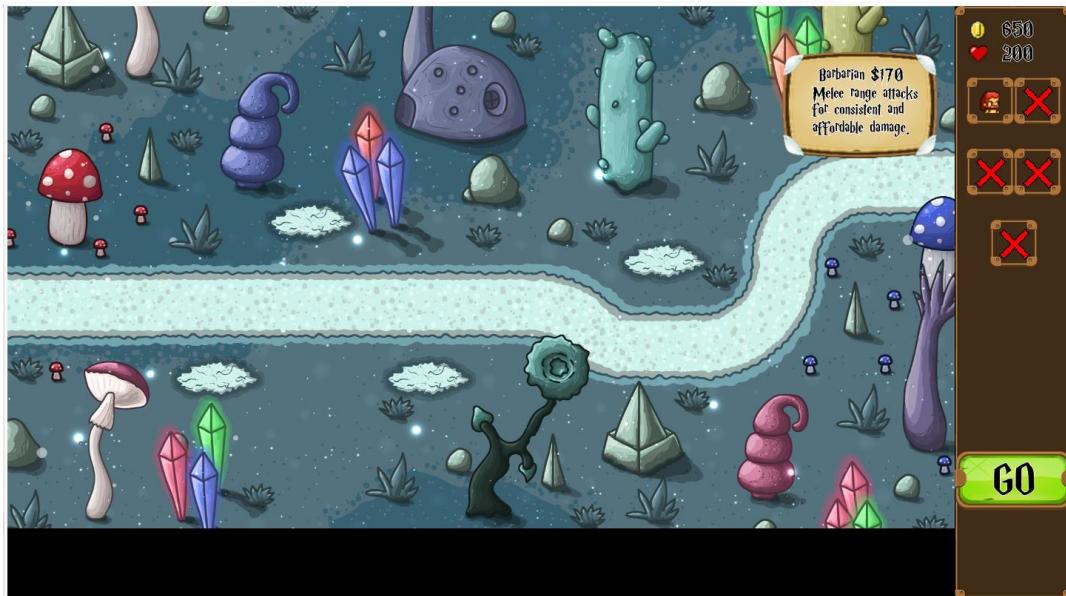
Figure 17: I added an image for the first character unlock, the barbarian and placed his icon on the UI. I then added a cross image to place over the other tiles to represent a currently locked character. I also added an event to detect when the character is hovered to display the cost and some brief information about it.

Figure 18: I implemented a spider class that follows the path from the beginning to the end. Following this I also added ghoul, goblin and dragon sprites that also follow the path.
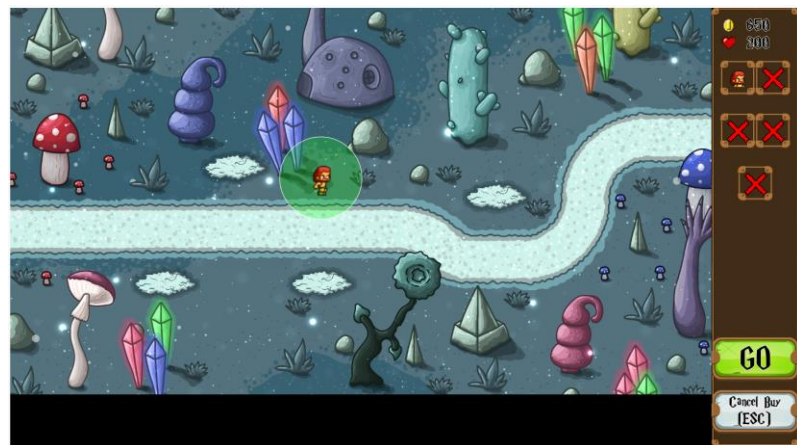

Figure 19: When selecting a weapon, I added a radius around it to denote its range. I also added a cancel buy button in the bottom right, which when clicked with a weapon selected would deselect it. Additionally, I added the Q key as a hotkey to select the barbarian and the ESC key to deselect the weapon.

Figure 20: I added a panel image onto the bottom, some text to denote the level and 2 buttons, one to toggle mute on the audio and a home button.

Figure 21: Added a confirm dialogue which would appear when the home button is pressed. If the user presses yes, they are returned to the main menu, if they hit the no button the dialogue closes.

Figure 22: I added a dialogue which pops up when the user successfully passes a level. Additionally, a new character is unlocked, in this case the wizard because level 1 was successfully passed. I repeated this process of weapon unlocks and dialogues for the remainder of the 5 levels
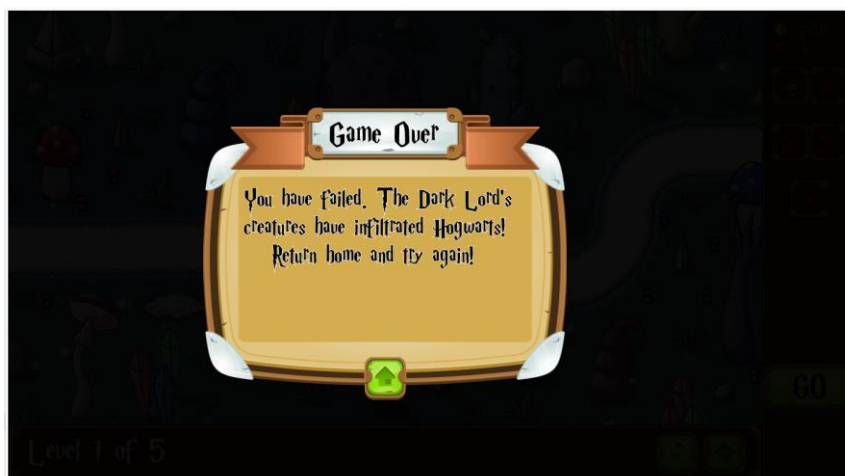

Figure 23: Added a game over screen which is triggered the player loses all 200 of their health. The background slowly fades to black whilst the dialogue displays. Additionally, 'defeat' music is playing.

Figure 24: I added the game won dialogue which would appear when the user successfully beats all 5 levels. The background for this would also fade to black whilst 'success' music plays.

Creative Influences

The major influence for my 'Hogwarts Tower Defence' game was Bloons Tower Defense. I used to play this game a lot as a child and throughout that whole time I loved it as it was engaging and took a bit of skill. In 'Hogwarts Tower Defence' game, the panel on the right hand side which contains the money, health and weapons takes a lot of similarly to the Bloons game. I thought it was ideal to replicate the UI layout as it's easily readable and can easily be navigated. Furthermore, in Bloons Tower Defense, when selecting a weapon, a ring is placed around it denoting the range of it. This ring would also change between a red and green hue depending on whether or not it's in a valid position. For example, if the weapon was selected and hovered over the path, the ring would be red because you're not allowed to place weapons on the path. I also took inspiration from this feature and added it to my own game.

Figure 25: The Bloons Tower Defense UI is very similar to my own.

My next inspiration was a flash game titled 'Age of War 2.' During my childhood this was another game I used to play a lot. It was quite a bit different from Bloons as you have to spawn characters from your own base to attack the opposing base. You can also buy upgrades to reinforce your own base with weapons. The opposition would also be doing the exact same thing. The one mechanic I took from Age of War 2 was the health bar which would be present above each character's head. From this, I drew inspiration to add my own health bars to my enemies in my Harry Potter game.

Figure 26: In Age of War 2, a HP bar is present above each character's head.

My third inspiration was the Pokémon Diamond and Pearl games, particularly the art style, on the Nintendo DS. I wanted to replicate the 'blocky' '8-bit' art style, seen in figure 27 into my own game. As a result, I took the time to locate as many sprites as I could that would adhere to this particular art style. In my game, the spiders, ghouls and the Ronald, Hermione and Harry sprites are examples of where I successfully found sprites that related to the 'blocky' '8-bit' art style from Pokémon Diamond and Pearl.

Figure 27: The art style of Pokemon Diamond and Pearl was an inspiration I tried to transfer over into my own game.

References

Tower Defense Map:

https://craftpix.net/product/tower-defense-2d-tileset-pack-3/

Hogwarts Castle Image:

https://ya-webdesign.com/explore/hogwarts-castle-png/

GUI Images:

https://www.gameart2d.com/free-fantasy-game-gui.html

Harry Potter Font:

https://www.dafont.com/harry-p.font

In Game Music:

https://www.youtube.com/watch?v=SpotBugZv0I

Red X Image:

http://pixelartmaker.com/art/ca82d4bd6bc48a0

Wizard Sprite Images:

https://craftpix.net/freebies/wizard-character-free-sprite/

Ron, Harry and Hermione Sprites:

https://www.vg-resource.com/archive/index.php/thread-19978.html

Ghoul Sprites:

https://www.spriters-resource.com/game_boy_gbc/harrypotterthechamberofsecrets/sheet/27771/

Spider Sprites:

https://www.spriters-resource.com/game_boy_gbc/harrypotterthechamberofsecrets/sheet/16445/

Barbarian, Goblin and Dragon Sprites:

https://mobilegamegraphics.com/product/pixelantasy-free-pixel-art/

Ron Icon:

https://www.gdunlimited.net/resources/image/1101/quidrony1png

Harry Icon:

https://www.gdunlimited.net/resources/image/1100/quidharryomb1png

Hermione Icon:

https://www.gdunlimited.net/resources/image/1082/charhermione1png

Won Game Music:

https://www.youtube.com/watch?v=D0ziHbGclkg

Lose Game Music:

https://www.youtube.com/watch?v=_8BwHHEopec

Hit Enemy Sound Effect:

https://www.youtube.com/watch?v=RaMIIpc46gM

Hover Button Sound Effect:

https://www.youtube.com/watch?v=vgPLysJM2TU

Heart Icon:

https://toppng.com/8-bit-heart-pixel-heart-PNG-free-PNG-Images_436283

Coin Icon:

https://www.pngitem.com/middle/mRRmTi_download-pixel-coin-png-png-images-8-bit/

PogU Emote:

https://www.frankerfacez.com/emoticon/256055-PogU

Harry Attack Sprites:

https://www.spriters-resource.com/game_boy_gbc/harrypotterthechamberofsecrets/sheet/27356/

Rectangle and Circle collision taken from the P5.js 2D.Collision library:

https://github.com/bmoren/p5.collide2D/blob/6a63a066cd2d43f951386ad0a2b95d24c04a5ee3/p5.collide2d.js#L30